AMENDMENTS TO THE DRAWINGS:

The attached sheet of drawings includes changes to FIG. 1. This sheet, which includes FIG. 1, replaces the original sheet including FIG. 1. No new matter is added.

Attachments: Replacement sheet of drawings
Annotated sheet of drawings showing changes.

REMARKS

With careful attention to the Examiner's comments in the Office Action, the Application has been amended to place it in condition for allowance. The remarks presented herein are believed to be fully responsive to the Office Action.

Claims 1-15 are pending in the present application. Applicant is amending claim 7 and canceling claims 10 and 12.

OBJECTION TO SPECIFICATION:

Applicant respectfully amends the specification in accordance with the Examiner's objection, as shown above. In addition, we correct the Korean patent number cited in Paragraph [0010]. No new matter is added.

DRAWING OBJECTION:

Applicant respectfully replaces Fig. 1 of the present application in accordance with the Examiner's objection. No new matter is added.

CLAIM REJECTIONS:

Claim Rejection under 35 U.S.C. § 103

LEGAL PRINCIPLE - To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves, or in the knowledge generally available to one of ordinary skill in the art, to modify

the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all claim limitations. The teaching or suggestion to make the claim combination or combine the references and the reasonable expectation of success must both be found in the prior art and not based on the Applicant's disclosure. In re Vaeck, 947 F.2d 488 (Fed. Cir. 1991).

With regard to the first criteria for a suggestion or motivation to modify or combine references, obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art. In re Kotzab, 217 F.3d 1368 (Fed. Cir. 2000). Courts and patent examiners should determine whether needs or problems known in the field and addressed by the prior art references can provide a reason for combining the elements in the manner claimed. KSR Intern. Co. v. Teleflex Inc., No. 04-1350, 2007 WL 1237837, at 4 (Apr. 30, 2007). "In formulating a rejection under 35 USC § 103(a) based upon a combination of prior art elements, it remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed." Memo on KSR Decision to Examiners issued by the United States Patent and Trademark Office, May 4, 2007. The prior art is not sufficient to establish obviousness without some objective reason to combine the teachings of the references. In re Kotzab, 217 F.3d 1368 (Fed. Cir. 2000), also see In re Sang Su Lee, 277 F.3d 1338 (Fed. Cir. 2002). Also, the proposed modification would render the prior art being modified unsatisfactory

for its intended purpose and there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F.2d 900 (Fed. Cir. 1984).

The Office Action states that claims 1-6 stand rejected under 35 U.S.C. 103(a), as allegedly being unpatentable over Nobuyuki et al. (Japanese Patent No. H10-084159) as modified by Edmond et al. (US 5,338,944) and further in view of Sung et al. (U.S. 2002/0179918), claims 7, 8, 11, 13 and 15 stand rejected under 35 U.S.C. 103(a), as allegedly being unpatentable over Nobuyuki et al. (Japanese Patent No. H10-084159) as modified by Nishi et al. (US 2003/0111666) as evidenced by Shi et al. (U.S. 6,130,001), and claims 9, 10, 12 and 14 stand rejected under 35 U.S.C. 103(a), as allegedly being unpatentable over Nobuyuki et al. (Japanese Patent No. H10-084159) as modified by Nishi et al. (US 2003/0111666) as evidenced by Shi et al. (U.S. 6,130,001), and further modified by Sung et al. (U.S. 2002/0179918).

Claim 1

With regard to claim 1, the Office Action states:

> Nobuyuki et al. differ from the claimed invention by not comprising the SiC layer having an n-type conductivity and a thickness of 5 to 500 A for the holes to be injected into the p-type III-nitride semiconductor layer by tunneling.
>
> Edmond et al. disclose a SiC semiconductor light emitting device (Fig. 3) comprising a top SiC contact layer (56) having an n-type conductivity (col. 6, lines 67-68 and col. 7, lines 6-8) to take advantage of greater conductivity and optical characteristics of n-type SiC layer (col. 7, lines 10-12).

The Office Action further states:

> Since both Nobuyuki et al. and Edmond et al. teach a semiconductor light emitting device comprising a SiC substrate and a SiC p-side contact layer, it would have

> been obvious to the one of ordinary skill in the art at the time the invention was made to combine the III-nitride semiconductor light emitting device disclosed by Nobuyuki et al. with the n-type p-side SiC contact layer disclosed by Edmond et al., because the n-type p-side SiC contact layer would have greater conductivity and better optical characteristics, and easier to form than p-type p-side SiC contact layer (col. 7, lines 12-16 in Edmond et al.).

This rejection is respectfully traversed.

As admitted by the Examiner, Nobuyuki et al. does not disclose the SiC layer having an n-type conductivity and a thickness of 5 to 500 Å for the holes to be injected into the p-type III-nitride semiconductor by tunneling. The Examiner asserts that it is obvious to one of ordinary skill in the art to combine the III-nitride semiconductor light emitting device disclosed by Nobuyuki et al. with the n-type p-side SiC contact layer disclosed by Edmond et al. However, Edmond et al. discloses not the SiC layer having an n-type conductivity and a thickness of 5 to 500 Å for the holes to be injected into the p-type III-nitride semiconductor by tunneling recited in Claim 1, but the "degenerate junction structure 52" in Fig. 3 of Edmond et al., which consists of an n-type layer 56 and a p-type layer 57.

Referring to Column 2, lines 58-68 of Edmond et al., "[t]o date, however, the art has lacked a technique for maximizing the use of n-type silicon carbide in p-n junction LEDs. For example, although the nature of n-type silicon carbide is such that it would be advantageous to use it for both a substrate and a top layer of an LED, the presence of a p-n junction between two n-type layers would essentially result in an n-p-n structure; i.e., a bipolar junction transistor. As is known to those of ordinary skill in this art, a transistor functions quite differently from an LED and thus such a structure has to date remained impractical and undesirable." To solve this problem, Edmond et al. discloses the "degenerate junction structure 17 in Fig. 1", "degenerate

junction structure 31 in Fig. 2" and "degenerate junction structure 52 in Fig. 3, which consists of an n-type layer 56 and a p-type layer 57. (Please note that the numeral 50 in Fig. 5 is a typo of the numeral 52).

As such, even the combined LED structure taught by Nobuyuki et al. and Edmond et al. does not teach or suggest the LED structure recited in Claim 1 of the present invention. Further, neither Nobuyuki et al. nor Edmond et al. teaches or suggests why the p-type SiC capping layer disclosed in Nobuyuki et al. is replaced with only the n-type SiC layer 56 of in Fig. 3 of the degenerate junction structure disclosed by Edmond et al.

At best, Nobuyuki et al. and Edmond et al. are nothing but an invitation to experiment with no direction on how to design the SiC capping layer having an n-type conductivity recited in Claim 1 of the present invention. There is simply no direction in neither of these references to the present invention. The only direction is through the application of forbidden hindsight. It is respectfully requested that the Patent Office reconsider and withdraw the rejections of the claims for the reasons stated above.

Claims 2-6

Claims 2-6 depend from independent claim 1 and, as such, are in allowable condition since claim 1 is clearly allowable over the cited prior art.

As such, Applicant respectfully asserts that claim 1 as amended and claims 2-6 depending therefrom are now in condition for allowance.

Claim 7

As shown above, the amended claim 7 further recites the limitations of the original claims 10 and 12.

With regard to claim 7, the Office Action states:

> Nishi et al. discloses a light emitting device (Fig. 1) comprising an active layer (112) (lines 3-4 of [0061]) and a p-side contact layer (111) (line 2 of [0061]) where the active layer (112) can be inorganic material and the p-side contact layer (111) can be CxNy layer (lines 2-8 of [0065]) as evidenced by Shi et al. (col. 2, lines 38-40).

With regard to claims 10 and 12, the Office Action states:

> Nobuyuki et al. as modified by Nishi et al. as evidenced by Shi et al. differ from the claimed invention by not showing that the doping concentration of the CxNy layer is in a range from 1 x 1018 to 1 x 1022 atoms/cm3 (claim 9), the CxNy layer has a thickness of 5 A to 55 A (claim 10), and the CxNy layer has an n-type conductivity (claim 12).
>
> Sung et al. disclose a III-nitride semiconductor light emitting device (Fig. 1) where the doping concentration and the thickness of the no-type conductivity, p-side contact layer (20) (lines 13-14 of [0011]) is 1.5 x 1020 atoms/cm3 and 20 A (lines 2-4 of [0013]).

The Office Action further states:

> Since both Nobuyuki et al. and Sung et al. teach a III-nitride semiconductor light emitting device, it would have been obvious to the one or ordinary skill in the art at the time the invention was made to combine the III-nitride semiconductor light emitting device disclosed by Nobuyuki et al. as modified by Nishi et al. as evidenced by Shi et al. with the doping concentration, thickness and conductivity type of the p-side contact layer disclosed by Sung et al., because the doping concentration, thickness and conductivity type of the p-side contact layer can be controlled to improve the performance of the III-nitride semiconductor light emitting device.

This rejection is respectfully traversed.

As admitted by the Examiner, Nobuyuki et al. as modified by Nishi et al. as evidenced by Shi et al. differ from the claimed invention by not showing that the CxNy layer has a thickness of 5 A to 55 A, and the CxN y layer has an n-type conductivity recited in the amended claim 7.

Nishi et al., even further modified by Sung et al., does not teach or suggest the n-type SiCN capping layer of amended claim 7 because the p-type SiC hole transporting layer 111 in Fig. 1 of Nishi et al. does not correspond to the n-type SiCN capping layer of amended claim 7. The p-type SiC hole transporting layer 111 in Fig. 1 of Nishi et al. only correspond to the p-type III-nitride semiconductor layer of amended claim 7, not the n-type SiCN capping layer. Further, these layers should have a sufficient thickness (for example: 1um) for supplying holes to active layer. However, there is no teaching or suggestion of the sufficient thickness to combine Nishi et al. and Sung et al.

In addition, these layers should have p-type conductivity, not the n-type conductivity, for supplying holes to the active layer. The Examiner asserts that it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to combine the p-type SiC hole transporting layer 111 as taught by Nishi et al. with the CxNy layer having an n-type conductivity as taught by Sung et al. to create a concrete the n-type SiCN capping layer of amended claim 7. However, as discussed above, it was not obvious to one having ordinary skill in the art, at the time the invention was made, to combine the p-type SiC hole transporting layer 111 as taught by Nishi et al. with the CxNy layer having an n-type conductivity as taught by Sung et al. to create a concrete the n-type SiCN capping layer of amended claim 7 because the p-type SiC hole transporting layer 111 as taught by Nishi et al. should have p-type conductivity for supplying holes to the active layer. In terms of suggestion or motivation to make the proposed modification, as such, Nishi et al. teaches away from the above-asserted combination. There is

no motivation to combine if a reference teaches away from its combination with another source. Tec Air., Inc. v. Denso Mfg. Michigan Inc., 192 F.3d 1353, 1360 (Fed. Cir. 1999).

Claims 8, 9, 11, 13, and 14

Claims 8, 9, 11, 13, and 14 depends from independent claim 7 and, as such, are in allowable condition since claim 25 is clearly allowable over the cited prior art.

As such, Applicant asserts that claim 7 as amended and claims 8, 9, 11, 13, and 14 depending therefrom are now in condition for allowance.

If any issue regarding the allowability of any of the pending claims in the present application could be readily resolved, or if other action could be taken to further advance this application such as an Examiner's amendment, or if the Examiner should have any questions regarding the present amendment, it is respectfully requested that the Examiner please telephone Applicant's undersigned attorney in this regard.

Respectfully submitted,

Date: November 1, 2007

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